



AI's Role in Achieving Net Zero

2024 CIBSE ANZ Seminar Series | The Need for Speed
SESSION 2 | AI tools to help us reach net zero

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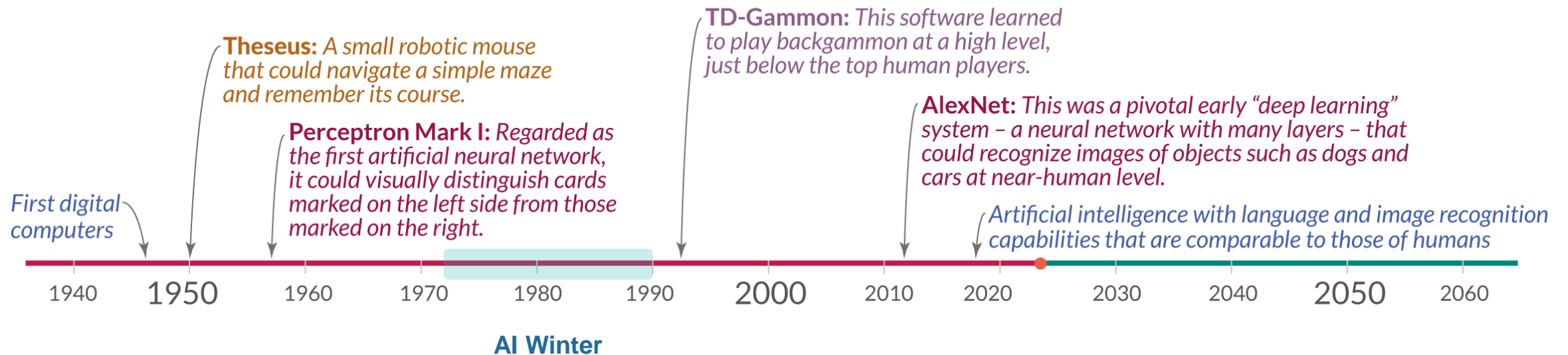
“

**The most disruptive
force in history**

Elon Musk

”

A timeline of notable artificial intelligence systems



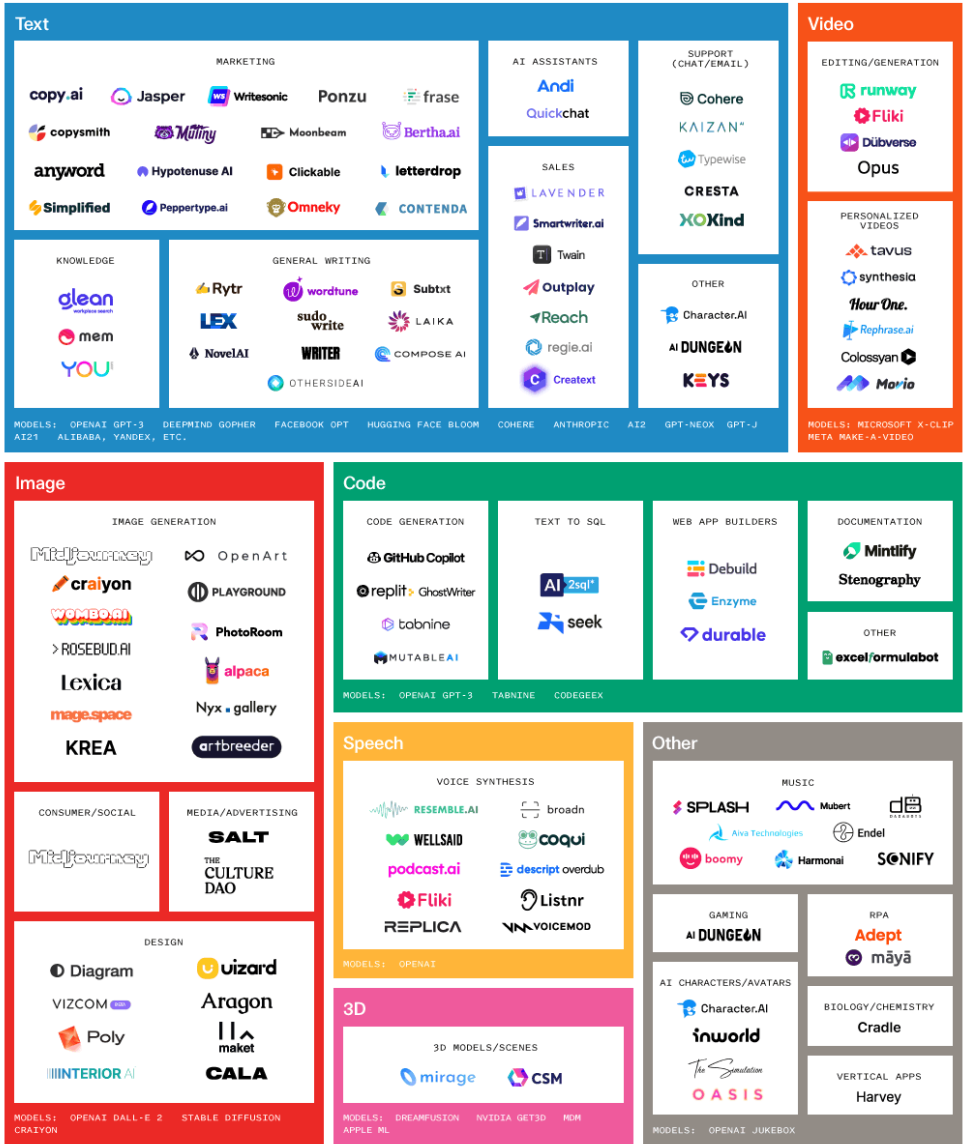


“ This is the first AI
technology that
has caught fire
with regular people

Sam Altman ”

The Generative AI Application Landscape v2

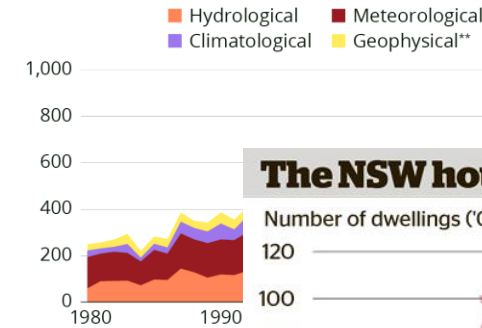
A work in progress



Source: Sequoia Capital (right); Statista (left)

Natural Disasters on the Rise Around the Globe

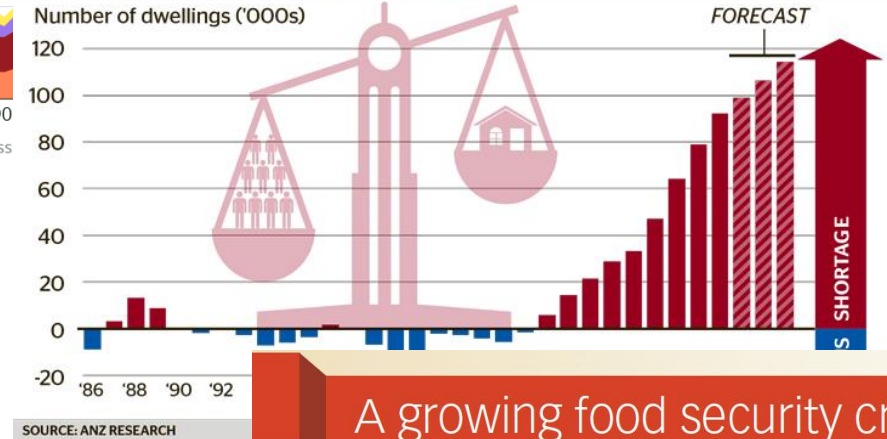
Number of natural disasters* by type of event (1980-2019)



* Registered as relevant loss
** Volcanic/tectonic activity
Source: MunichRe



The NSW housing shortage



SOURCE: ANZ RESEARCH

A growing food security crisis

135 million people

in 55 countries
were in crisis or worse
(IPC/CH Phase 3 or above)

More than half of the affected
people were in Africa



Mott MacDonald Restricted

How can AI help us get to net zero?



poll on chat

1

Carbon Emissions Measurement

AI lightens the load with knowledge graphs and natural language models, enabling granular analysis beyond human capability.

2

Climate Change Resilience

AI can enhance climate modelling capabilities, and our ability to get insights that help businesses, communities, and policymakers take proactive measures to address climate-related risks and build resilience.

3

Circular Economy

AI can optimise circular material flows in the AEC industry, enhancing the reuse and recycling of construction materials and providing architects, engineers, and designers with sustainable material and design options.

4

Embodied Carbon

Engineers and designers play a crucial role in reducing embodied carbon in buildings by choosing the right materials and systems and using them efficiently.

5

Cleaner Energy

AI and IoT technologies can improve the integration of renewables into the existing grid, making renewable energy more reliable and modernizing the overall grid.

How can AI help us get to net zero?

Carbon Emissions Measurement

1

Carbon Emissions Measurement

AI lightens the load with knowledge graphs and natural language models, enabling granular analysis beyond human capability.



40% of a sustainability professional's time is spent collecting and cleaning data for carbon emissions measurements



Only 1 in 20 of those asked were 70% confident in the accuracy of their emissions calculations



AI can lighten the burden on sustainability professionals through knowledge graphs and natural language models

Source: World Economic Forum, These new technologies will accelerate the transition to net zero

How can AI help us get to net zero?

Climate Change Resilience

2

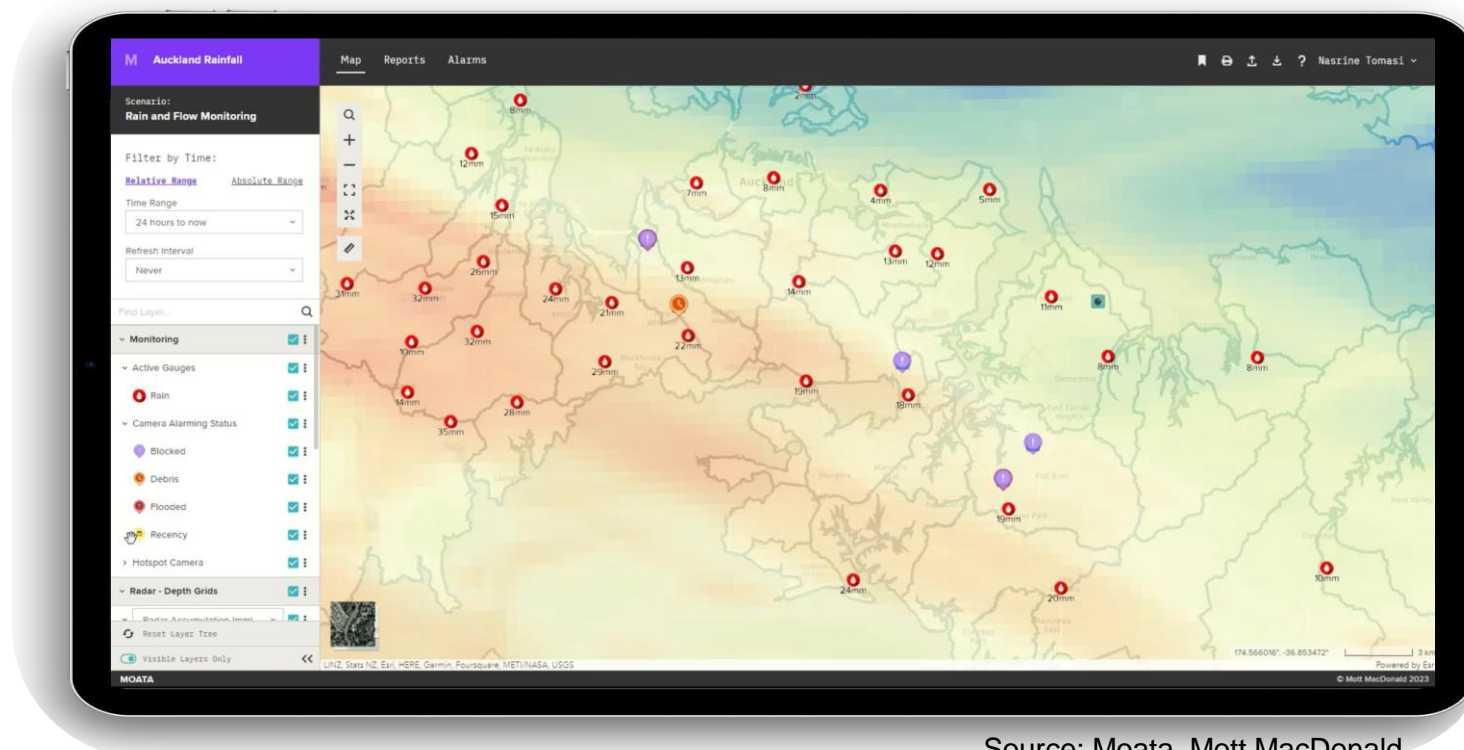
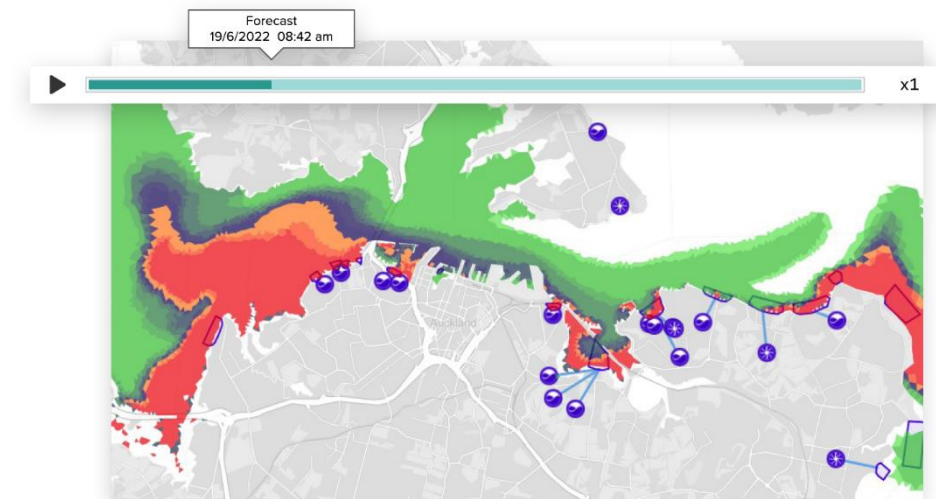
Climate Change Resilience

AI can enhance climate modelling capabilities, and our ability to get insights that help businesses, communities, and policymakers take proactive measures to address climate-related risks and build resilience.



**Faster, more reliable
flood management
with neural networks**

Using AI to predict and better manage stormwater flooding improving resilience to climate change.



Source: Moata, Mott MacDonald

How can AI help us get to net zero?

Circular Economy

3

Circular Economy

AI can optimise circular material flows in the AEC industry, enhancing the reuse and recycling of construction materials and providing architects, engineers, and designers with sustainable material and design options.

“Intelligent robotic systems can process almost any given waste stream, and sorting capabilities can be redefined for every new market situation—even on a daily basis.”

WASTE MANAGEMENT WORLD



**ARTIFICIAL
INTELLIGENCE
AND THE CIRCULAR
ECONOMY**
AI AS A TOOL
TO ACCELERATE
THE TRANSITION

How can AI help us get to net zero?

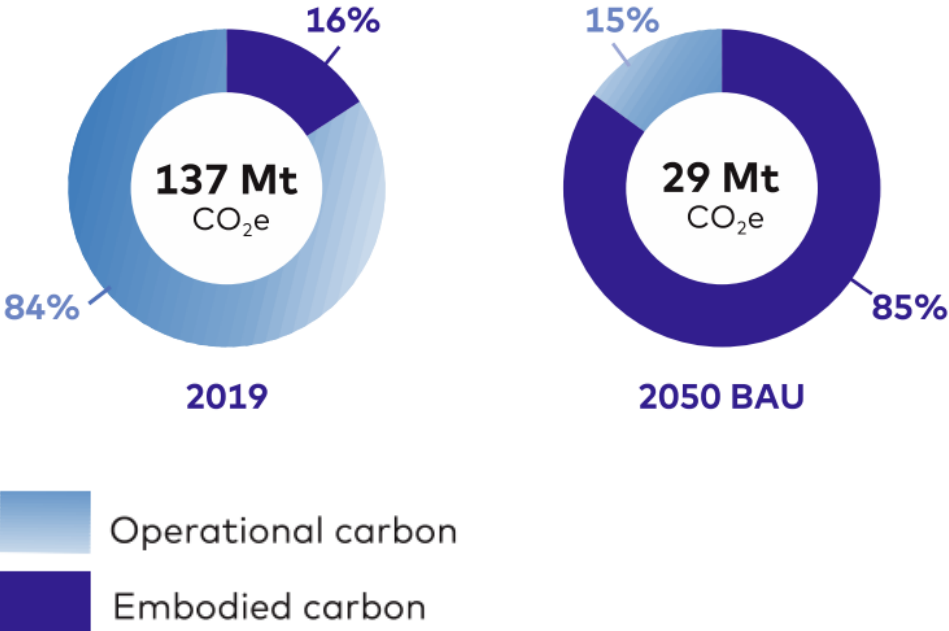
Embodied Carbon

4

Embodied Carbon

Engineers and designers play a crucial role in reducing embodied carbon in buildings by choosing the right materials and systems and using them efficiently.

Estimated embodied carbon in Australia's building stock



Plan, design, build, operate | All sectors

Moata Carbon Portal

Moata Carbon Portal is an infrastructure carbon calculator aligned to the PAS 2080 certification that allows anyone across your business and supply chain to identify and calculate carbon emissions, not just the carbon experts. We believe the more people involved in reducing carbon emissions, the bigger the results.

[Learn more](#)

[Book a demo](#)

Embodied Carbon Summary

Last Refreshed: 26 August 2020

Mass: 1,092,189 (t)

Embodied Carbon: 150,154 (CO₂e t)

Embodied Carbon Cost: \$7.28M

\$48.50 / tonne

Filter

Design Package: All

Material: All

3D View

Model Summary

Material/Package Name	Carbon (%)	Mass (t)	Carbon (CO ₂ e t)	Carbon Cost (\$)
GP100 - Mass (Steel Reinforcement)	17.2%	187,424	155,472	\$5,374,400
GP100 - Mass (Reinforcing Steel - Reinforcement)	2.1%	1,458	172	\$6,827
GP100 - Mass (Steel Decking)	4.2%	87	351	\$12,167
GP100 - Mass (Wall and Partition - Concrete)	0.2%	3,717	1,333	\$46,088
GP100 - Mass (Wall and Partition - Concrete - Wall Support System)	0.5%	6,413	776	\$27,425
GP100 - Mass (Roof Deck - Concrete & Transformed Concrete Deck)	1.3%	16,536	2,990	\$97,366
GP100 - Mass (Roof Deck - Concrete & Transformed Concrete Deck)	1.5%	15,342	2,680	\$93,871
GP100 - Mass (Roof Deck - Concrete)	1.4%	171	2,038	\$69,312
GP100 - Mass (Roof Deck)	0.3%	126	189	\$6,741
GP100 - Mass (Roof Deck)	0.3%	2,876	9,205	\$319,517

Total Embodied Carbon / Mass by Material

How can AI help us get to net zero?

Cleaner Energy

5

Cleaner Energy

AI and IoT technologies can improve the integration of renewables into the existing grid, making renewable energy more reliable and modernising the overall grid.

GPT-3 consumes...

- 285,000 CPU cores
- 10,000 NVIDIA GPUs
- Training: 10 GWh
- Daily queries: 1 GWh each day
- **52,000 NZ households daily**



GPT-? estimates by 2027

- Estimated that AI sector could consume between 85 - 134 TWh each year by 2027.
- 233 - 367 GWh each day.
- **12 – 19 million households daily.**



What
does this
mean?

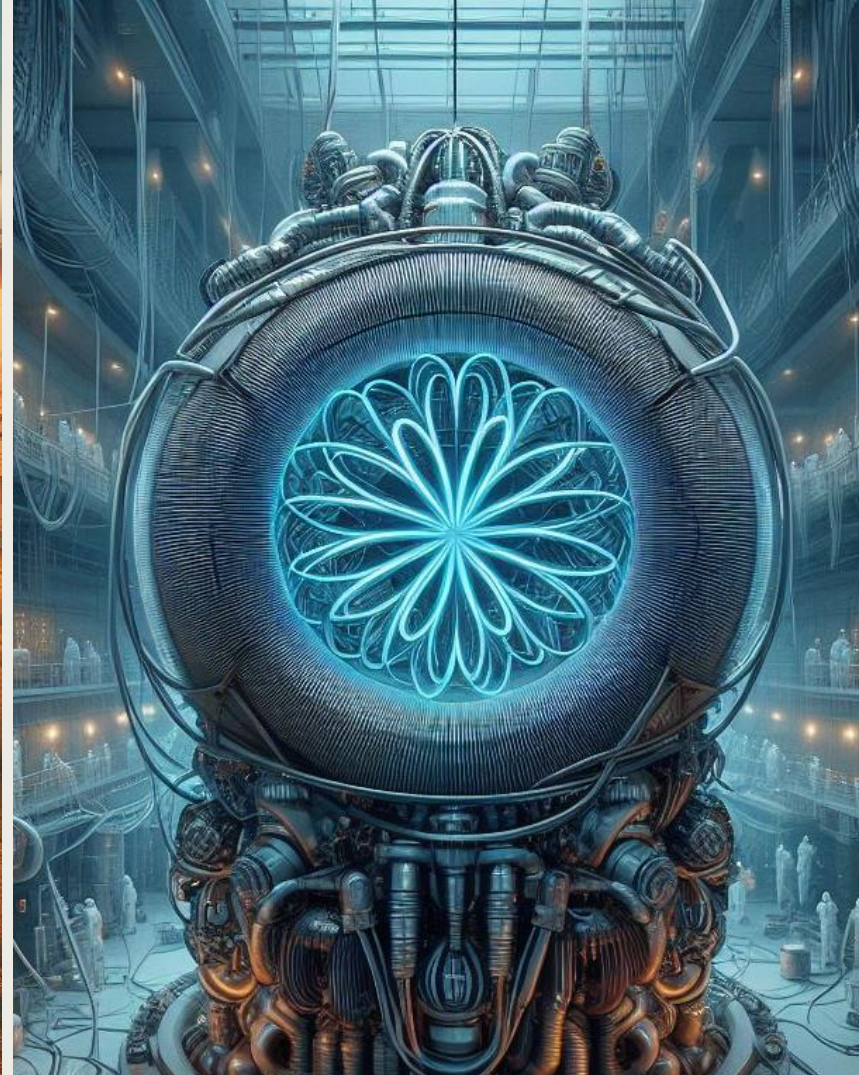
Source: <https://www.newswise.com/articles/qa-uw-researcher-discusses-just-how-much-energy-chatgpt-uses>



4x area of NZ +
Enormous batteries
(67 times 2024 PV capacity)



>8 millions wind turbines +
Enormous batteries
(Currently circa 340,000
turbines worldwide)



Fusion: ?

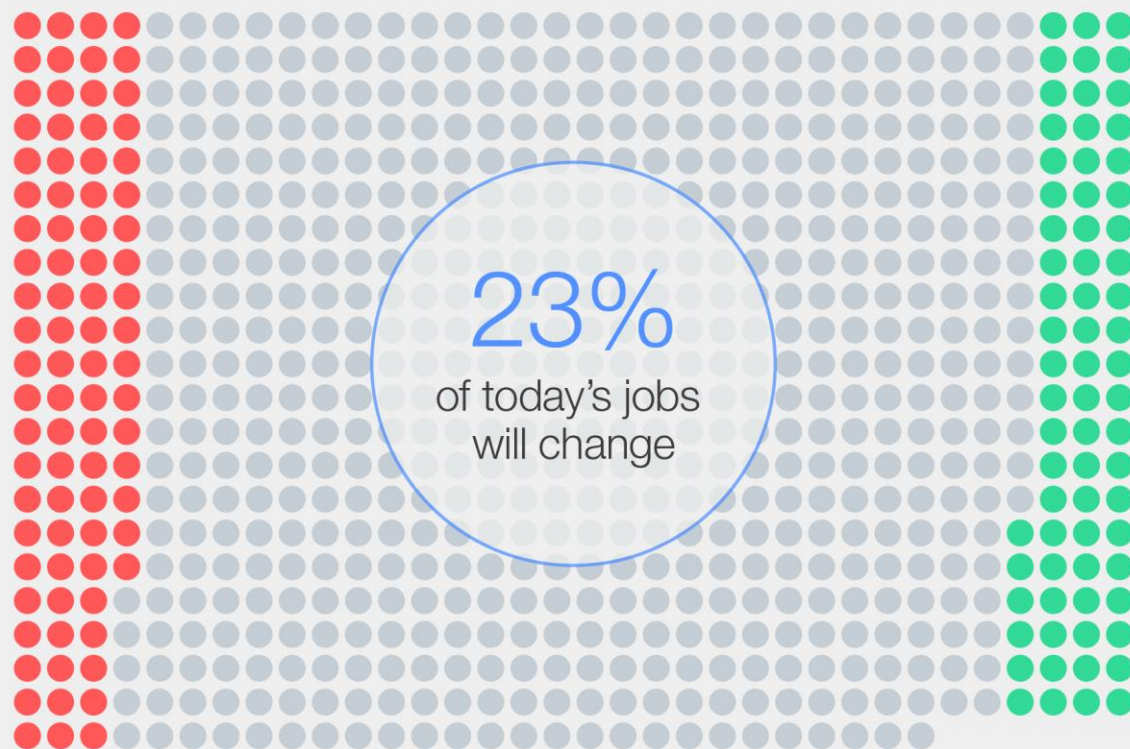
Sam Altman invested \$375
million



poll on chat

Future of Jobs

Total job growth and loss



○ One million: ● Lost jobs ● Stable jobs ● New jobs

Source: World Economic Forum, *Future of Jobs Report 2023*.

Future of Jobs

Reskilling needs



44%

of workers' core skills
are expected to change
in the next five years



Source: World Economic Forum,
Future of Jobs Report 2023.

Jobs emerging from the adoption of large language models



Large language models (LLMs) will transform collaboration between humans and AI, reshaping job roles. While outcomes remain uncertain, potential new job areas could emerge with LLM adoption.

Trainers



AI Model and Prompt Engineers

Explainers



Interface and Interaction Designers



AI Content Creators

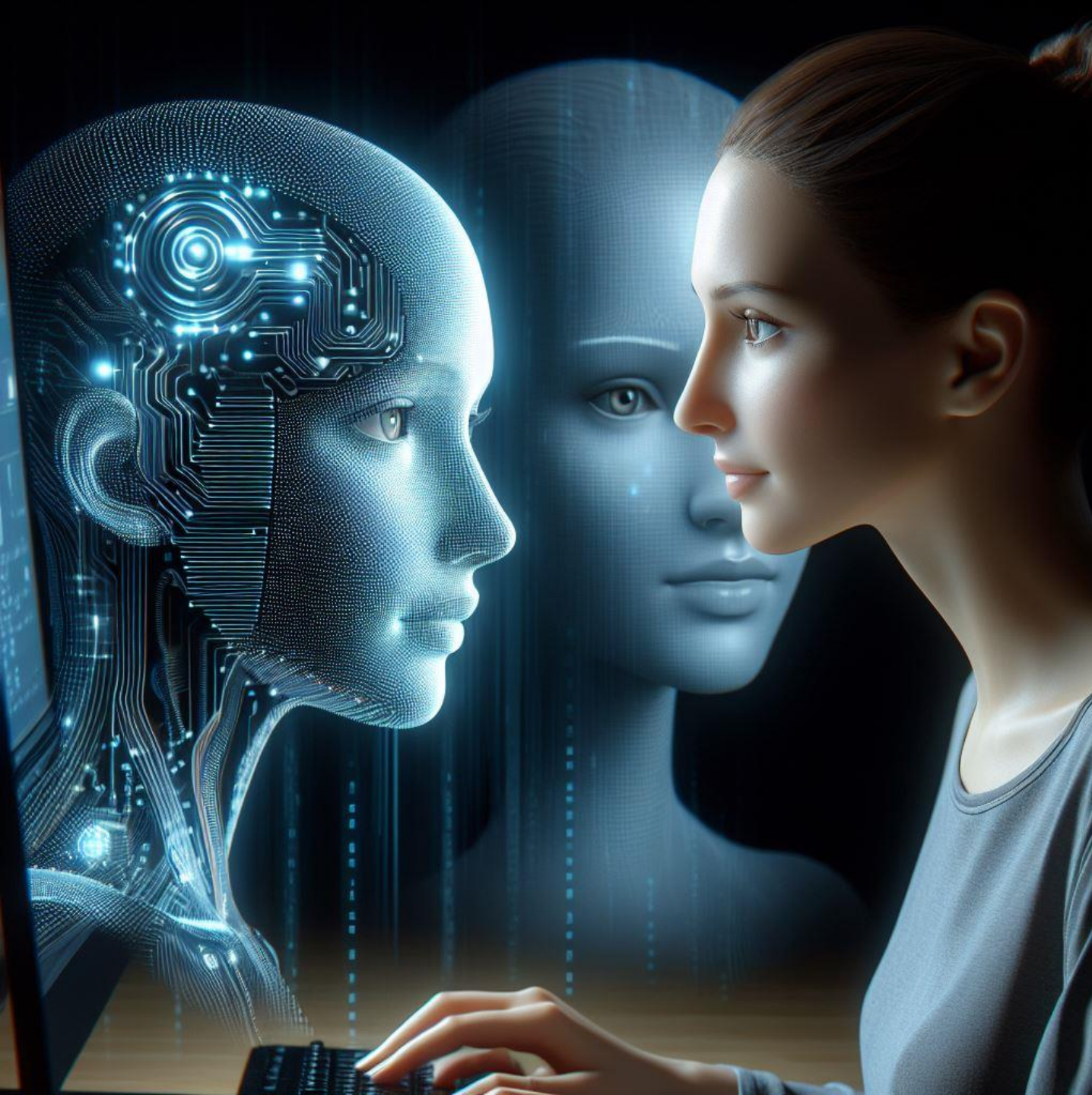
Sustainers



Data Curators and Trainers



Ethics and Governance Specialists



Prompt Engineering

Source: Created Image Creator by Designer, powered by DALL-E 3, prompts by Maria Mingallon.



Closing remarks

If Not Us, Who? If Not Now, When?

John F. Kennedy (attributed)

Originally peened by Rabbi Hillel The Elder:
“If I am not for myself, who will be for me? But when I
am only for myself, what am I? And if not now, when?”
(Pirkei Avot 1:14)



Questions

Key Resources

Key Resources

- "These new technologies will accelerate the transition to net zero" by the World Economic Forum (<https://www.weforum.org/agenda/2023/06/these-new-technologies-will-accelerate-the-transition-to-net-zero/>).
- "Future of Jobs Report 2023" by the World Economic Forum (<https://www.weforum.org/publications/the-future-of-jobs-report-2023/>)
- "AEC AI Hub" (<https://stjepanmikulic.com/>) and [AI in AEC: The Fundamentals](#)) both by Stjepan Mikulic.
- "Artificial intelligence and the circular economy" by the Ellen MacArthur Foundation (<https://www.ellenmacarthurfoundation.org/artificial-intelligence-and-the-circular-economy>)
- "Embodied Carbon & Embodied Energy in Australia's Buildings, July 2021" by the Green Building Council Australia: (<https://www.thinkstep-anz.com/assets/Whitepapers-Reports/Embodied-Carbon-Embodied-Energy-in-Australias-Buildings-2021-07-22-FINAL-PUBLIC.pdf>)
- AI Forum NZ, AI Knowledge Hub (<https://aiforum.org.nz/knowledgehub/>) and AI for the Environment (<https://aiforum.org.nz/2021/07/30/environmental-ai-for-a-greener-aotearoa/>)